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### A FASTENER DEVICE

This invention relates to a fastener device.

Fastener devices comprising a threaded member for receiving a nut are well known. Such fastener devices are widely used in many applications ranging, for example, from retaining wheels in position on motor vehicles and aircraft to retaining steel girders in position in buildings. There is often a problem with the known fastener devices in that the nuts tend to work loose, for example due to the effects of vibration.

It is an aim of the present invention to obviate or reduce the above mentioned problem.

Accordingly, in one non-limiting embodiment of the present invention there is provided a fastener device comprising a nut, a threaded member for receiving the nut, and visual indicator means for visually indicating if the nut has become loose on the threaded member during use of the fastener device.

The visual indicator means provides a simple means of indicating if a nut has become loose. The nut can then be tightened as necessary.

Preferably, the fastener device is one in which the visual indicator means comprises an indicator member which is mounted on the nut, biasing means which biases the indicator member to an indicating position in which

the indicator member gives a visual indication that the nut has become loose, and at least one recess into which the indicator member is moved by the biasing means consequent upon the nut becoming loose, the indicator member then being in the indicating position.

The indicator member may include an indicator portion which moves to the indicating position.

The fastener device may include a pivot member which pivotally mounts the indicator member on the nut. Preferably, the pivot member pivotally mounts the indicator member in a slot in the nut.

The recess for receiving the indicator member is preferably a slot on the threaded member. Other types of recess may however be employed.

The fastener device may be one in which there are at least two of the recesses for receiving the indicator member. As many of the recesses as desired may be employed.

The fastener device may be one in which there is only one of the indicator members on the nut. Alternatively, the fastener device may be one in which there are at least two of the indicator members on the nut. Generally, as many of the indicator members may be employed as is required to achieve a required degree of visual awareness and/or safety.

The biasing means may be a coil spring. Alternatively, the biasing means may be a V-spring. Other types of biasing means may be employed.

Advantageously, at least a part of the indicator member is coloured so as to attract attention. The indicator member may thus be provided with a non-fluorescent colour or a fluorescent colour. More than one colour may be employed if desired. Where a colour is employed, then it is preferably employed on at least sides of the indicator member.

The visual indicator means may be made of a plastics material. Any suitable and appropriate plastics material may be employed, for example nylon. Materials other than plastics materials may be employed if desired.

The threaded member will usually be a bolt or a stud. The threaded member will usually be made of a metal but other materials including plastics materials may be employed.

The fastener device of the present invention may be used for retaining wheels in position on vehicles such for example as cars, vans, lorries, coaches and buses. The fastener device may also be used as a central fastener device for retaining wheels in position in racing vehicles. The fastener device may alternatively be used as part of scaffolding clamps, especially where

vibration is likely to cause loosening of the clamps. The fastener device may still further be used in the construction industry for bolting girders together, or in the aircraft industry for retaining components together.

Embodiments of the invention will now be described solely by way of example and with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a first fastener device in a tightened condition;

Figure 2 is a sectional view through part of the fastener device in the condition shown in Figure 1;

Figure 3 is a top plan view of the fastener device in the condition shown in Figure 1;

Figure 4 shows the first fastener device in a loosened condition;

Figure 5 is a section through part of the fastener device in the loosened condition shown in Figure 4;

Figure 6 is a top plan view of the fastener device in the loosened condition shown in Figure 4;

Figure 7 is a perspective view of a second fastener device;

Figure 8 is a top plan view of a third fastener device;

Figure 9 is a section through part of the fastener device shown in Figure 8;

Figure 10 is an exploded view of parts of the fastener device shown in Figure 8;

Figure 11 is a perspective view of a third fastener device;

Figure 12 is a side view of a nut part of the fastener device shown in Figure 11;

Figure 13 is a top plan view of the fastener device shown in Figure 11;

Figure 14 is a side view of part of the fastener device shown in Figure 11 and illustrates how the fastener device is used with a socket spanner;

Figure 15 is a top plan view of the part of the fastener device as shown in Figure 14;

Figure 16 is a perspective view of visual indicator means employed in the fastener device shown in Figure 11; and

Figure 17 shows part of the visual indicator means shown in Figure 16.

Referring to Figures 1-6, there is shown a fastener device 2 comprising a nut 4, a threaded member 6 for receiving the nut 4, and visual indicator means 8. The visual indicator means 8 is for visually indicating if the nut 4 has become loose on the threaded member 6 during use of the fastener device 2.

The visual indicator means 8 comprises an indicator member 10 which is mounted on the nut 4, and biasing

means 12 which biases the indicator member 10 to an indicating position in which the indicator member 10 gives a visual indication that the nut 4 has become loose. This indicating position is shown in Figures 4, 5 and 6. The visual indicator means 8 also comprises a recess 14 into which the indicator member 10 is moved by the biasing means 12 consequent upon the nut 4 becoming loose. When the indicator member 10 moves into the recess 14, then the indicator member 10 is in the indicating position.

The indicator member 10 includes an indicator portion 16 which moves to the indicating position.

A pivot member 18 pivotally mounts the indicator member 10 on the nut 4. More specifically, the pivot member 18 pivotally mounts the indicator member 10 in a slot 20 in the nut 4.

The recess 14 for receiving the indicator member 10 is in the form of a slot. The recess 14 is on the threaded member 6.

Figure 5 shows in dotted lines a second recess 14. This illustrates an optional alternative to having only one recess 14. Generally, as many recesses 14 as may be required can be employed.

As can be seen from Figures 1-6, there is only one indicator member 10 on the nut 4. If desired however in alternative embodiments of the fastener device 2, two or

more of the indicator members 10 may be employed on the nut 4.

As shown in Figures 2,3,5 and 6 the biasing means 12 is in the form of a coil spring.

If desired, at least a part of the indicator member 10 may be coloured so as to attract attention. Preferred parts of the indicator member 10 that are coloured are the sides of the indicator portion 16.

The visual indicator means 8 is preferably made of a plastics material but other materials may be employed if desired. The threaded member 6 may be in the form of a bolt or a stud, and it will usually be made of a metal but other materials may be employed if desired.

Referring to Figures 7-10, there is shown a second fastener device 22 comprising a nut 24 and a threaded member 26. The threaded member 26 is in the form of a typical stud for a wheel of a truck, the threaded member 6 being modified to include four of the recesses 14. The nut 24 has visual indicator means 28. The visual indicator means 28 is similar to the visual indicator means 8 and similar parts have been given the same reference numerals for ease of comparison and understanding. As can be seen from Figures 8 and 9, the biasing means 12 is in the form of a V-spring which passes over the pivot member 18. As best shown in Figure 10, one leg of the V-spring 12 locates in an undercut

portion 30 in the indicator member 10. This then enables the other leg of the V-spring to press against the indicator member 10. With four of the slots 14, then maximum loosening cannot exceed  $90^{\circ}$ .

Referring now to Figures 11-17 there is shown a third fastener device 32 comprising a nut 34, a threaded member 36 and six separate visual indicator means 38. The visual indicator means 38 are each constructed as show most clearly in Figures 12, 13, 16 and 17. It will be seen that each visual indicator means 38 comprises a visual indicator member 40 and a pivot member 48 which is ring shaped as best shown in Figure 16. The biasing means 12 is in the form of a ring shaped spring, again as best shown in Figure 16. The arrangement shown in Figure 16 fits over the nut 34 as best shown in Figures 11 and 12.

Figures 14 and 15 illustrate how a socket spanner 50 can be employed to force the six indicator members 10 inwardly for tightening purposes. With six of the indicator members 10, maximum loosening of the nut 4 cannot exceed  $60^{\circ}$ .

It is to be appreciated that the embodiments of the invention described above with reference to the accompanying drawings have been given by way of example only and that modifications may be effected. Thus, different types of threaded member 6, 26, 36 may be



employed, depending upon the various intended uses of the fastener devices 2, 22, 32. The illustrated four slots 14 shown in the drawings may be more or less slots. Generally there may be from 1-6 slots, for example three slots. The spring and hinge arrangement shown for example in Figure 16 may be made in one piece instead of two pieces.

CLAIMS

1. A fastener device comprising a nut, a threaded member for receiving the nut, and visual indicator means for visually indicating if the nut has become loose on the threaded member during use of the fastener device.

2. A fastener device according to claim 1 in which the visual indicator means comprises an indicator member which is mounted on the nut, biasing means which biases the indicator member to an indicating position in which the indicator member gives a visual indication that the nut has become loose, and at least one recess into which the indicator member is moved by the biasing means consequent upon the nut becoming loose, the indicator member then being in the indicating position.

3. A fastener device according to claim 2 in which the indicator member includes an indicator portion which moves to the indicating position.

4. A fastener device according to claim 2 or claim 3 and including a pivot member which pivotally mounts the indicator member on the nut.

5. A fastener device according to claim 4 in which the pivot member pivotally mounts the indicator member in a slot in the nut.

6. A fastener device according to any one of claims 2-5 in which the recess for receiving the indicator member is a slot on the threaded member.

7. A fastener device according to any one of claims 2-6 in which there are at least two of the recesses for receiving the indicator member.

8. A fastener device according to any one of claims 2-7 in which there is only one of the indicator members on the nut.

9. A fastener device according to any one of claims 2-7 in which there are at least two of the indicator members on the nut.

10. A fastener device according to any one of claims 2-9 in which the biasing means is a coil spring or a V-spring.

11. A fastener device according to any one of claims 2-10 in which at least a part of the indicator member is coloured so as to attract attention.

12. A fastener device according to any one of the preceding claims and in which the visual indicator means is made of a plastics material.

13. A fastener device according to any one of the preceding claims and in which the threaded member is a bolt or a stud.

14. A fastener device substantially as herein described with reference to the accompanying drawings.